

What is claimed is:

1. A method for identifying a cell having a desired oligonucleotide-directed sequence alteration at a first nucleic acid target site within the cell, the method comprising:
identifying said desired sequence alteration in cells that have been selected for the presence of a selectable phenotype conferred by a concurrent oligonucleotide-directed sequence alteration at a second nucleic acid target site within said cells.
2. A method for effecting a desired sequence alteration at a first nucleic acid target site within a cell, the method comprising:
concurrently targeting first and second nucleic acid sites within said cell for sequence alteration with respective first and second sequence-altering oligonucleotides, wherein said second alteration confers a selectable phenotype upon said cell;
selecting cells having said selectable phenotype; and then
identifying among the selected cells a cell having the desired sequence alteration at said first nucleic acid target site.
3. The method of claim 1 or 2, wherein said selectable phenotype is selected from the group consisting of: antibiotic resistance, prototrophy, expression of a fluorescent protein, presence of an epitope, and resistance to an apoptotic signal.
4. The method of claim 1 or 2, wherein the nucleic acid molecule comprising the first nucleic acid target does not comprise the second nucleic acid target.
5. The method of claim 1 or 2, wherein the nucleic acid molecule comprising the first nucleic acid target comprises the second nucleic acid target.
6. The method of claim 1 or 2, wherein the first nucleic acid target site is in a DNA molecule selected from the group consisting of: a chromosome, a plasmid, a YAC, a BAC, a PLAC, a MAC, and a PAC.
7. The method of claim 1 or 2, wherein the cell is selected from the group consisting of: a prokaryotic cell, a fungal cell, a plant cell, an animal cell, and a mammalian cell.

8. A composition for effecting a desired sequence alteration at a first nucleic acid target site within a cell, comprising:

first and second sequence-altering oligonucleotides, wherein the oligonucleotides are capable of effecting sequence alteration at the first nucleic acid target site and at a second nucleic acid target site, respectively; and

wherein alteration of the second nucleic acid target site confers a selectable phenotype.

9. The composition of claim 8, wherein said selectable phenotype is selected from the group consisting of: antibiotic resistance, prototrophy, expression of a fluorescent protein, presence of an epitope, and resistance to an apoptotic signal.

10. The composition of claim 8 further comprising a cellular repair protein.

11. The composition of claim 8, further comprising a cell selected from the group consisting of: a prokaryotic cell, a fungal cell, a plant cell, an animal cell, and a mammalian cell.

12. A kit for effecting a desired sequence alteration at a first nucleic acid target site within a cell, comprising:

first and second sequence-altering oligonucleotides, wherein the oligonucleotides are capable of effecting sequence alteration at the first nucleic acid target site and at a second nucleic acid target site, respectively; and

wherein alteration of the second nucleic acid target site confers a selectable phenotype.

13. The kit of claim 12 further comprising a cellular repair protein.

14. The kit of claim 12, wherein the cellular repair protein is selected from the group consisting of: RAD10, RAD51, RAD52, RAD54, RAD55, MRE11, PMS1 and XRS2.

15. The kit of claim 12 further comprising an HDAC inhibitor; hydroxyurea or lambda phage beta protein.

16. The kit of claim 12 further comprising a cell selected from the group consisting of: a prokaryotic cell, a fungal cell, a plant cell, an animal cell, and a mammalian cell.

17. The kit of claim 16, wherein the cell has increased levels or activity of at least one protein selected from the group consisting of: RAD10, RAD51, RAD52, RAD54, RAD55, MRE11, PMS1 and XRS2.

18. The kit of claim 16, wherein the cell has decreased levels or activity of at least one protein selected from the group consisting of: RAD10, RAD51, RAD52, RAD54, RAD55, MRE11, PMS1 and XRS2.

19. The kit of claim 16, wherein the cell comprises a target nucleic acid sequence, wherein alteration of said target nucleic acid sequence by said second oligonucleotide confers a selectable phenotype.

20. The kit of claim 12, wherein the kit further comprises instructions for performing the method of claim 1 or claim 2.